PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

NEW SERIES NUMBER FIFTEEN

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PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

Kuala Lumpur November 1954 Number 15

A Joint Development Project

In place of the usual Editorial we present an article reviewing the position for cyclised rubber, written by Mr E.P.B. Edwards, of Rubber Technical Developments Ltd.

Research on the product, often called consumption research, is done in the United Kingdom by the British Rubber Producers' Research Association (B.R.P.R.A.) and by Rubber Technical Developments Ltd, (R.T.D.). A recent article, in *Planters' Bulletin 12,* described this work and distinguished it from the research on production, as done by the R.R.I. in Malaya. The progress of research, development and ultimate manufacture of cyclised rubber in this country provides a good example of the close cooperation between the research units in Malaya and the United Kingdom to aid the natural rubber industry.

There are various methods of making cyclised rubber but the Malayan product is manufactured direct from latex. The term cyclisation means that the rubber molecule has been changed from a linear to a cyclic structure, in this instance by treatment with sulphuric acid. The cyclised rubber can be used as an ingredient in rubber compounds to introduce desirable properties, yet without increasing its density as when minerals and carbon black are used. A light coloured rubber compound can also be obtained.

It was discovered some years ago that the addition of certain chemicals to latex prevented its coagulation when sulphuric acid was added to it. This allowed the latex to be cyclised but the product after coagulation was an extremely fine suspension of fully cyclised rubber particles in the serum. The difficulty was to sieve and dry this material economically. Even then the final product, a fine powder, was difficult to incorporate with uncyclised sheet rubber, either in an internal mixer or on a conventional two roll mixing mill.

At this stage the B.R.P.R.A. tried blending the fully cyclised latex with an equivalent amount of stabilised 60% centrifuged latex before coagulation. When the mixture was poured into boiling water a good coagulum was obtained with a clear serum. This coagulum could be washed and sheeted on a normal washing or creping mill, to obtain a final product which contained equal proportions by weight of cyclised and uncyclised rubber — a 50/50 masterbatch.

The project was then handed over to R.T.D. for pilot plant work. Early in 1951 small scale plant was installed at Welwyn Garden City and several hundred pounds of material were produced. What use was there for this new material? It appeared that it might compete with the

synthetic resins which were replacing leather rapidly in the United States of America and were coming into the United Kingdom market. Sample soling materials were sent to the British Boot & Shoe Research Association for testing. Results were so promising that samples of the masterbatch were then distributed to numerous rubber manufacturers in the United Kingdom, together with a guide to the compounding of the material for a soling compound. It was appreciated, of course, that every manufacturer had his own idea of making up a soling compound to match the synthetic material which was becoming popular. All those to whom samples were sent showed keen interest in the cyclised masterbatch and the majority of them wanted to know when and where they could obtain larger supplies.

At this stage it was considered that large scale production would be more economical in Malaya. Despite the high cost of transporting guaranteed 98% commercial sulphuric acid from England to Malaya it was estimated that if field latex or skim could be used for the uncyclised portion of the batch, instead of 60% centrifuged latex as in the United Kingdom, there would be a considerable saving on the cost of manufacture of the final product. A pilot plant was set up in September 1952 by R.T.D. at the R.R.I. Experiment Station, Sungei Buloh. It was found that field latex or skim, or a mixture of both, could be used as the uncyclised rubber portion, to give a satisfactory material.

Once again potential users were supplied with samples and again the query was: 'When can we expect regular supplies?' As R.T.D. is not a commercial organisation it had to be explained that these would not be available until commercial undertakings in Malaya started production. To speed the commercial production of cyclised rubber masterbatch, part of the R.T.D. pilot plant was loaned to prospective producers in 1953. As increasing interest was shown in cyclised rubber in England and Malaya the Board of R.T.D. decided in December 1953 that a larger scale plant should be set up at Sungei Buloh for demonstrating the process to potential producers, users and exporters. This plant is now installed and demonstrations are being given to potential producers. At least four commercial undertakings are expected to be in production by the end of the year.

The manufacture of the cyclised rubber masterbatch for shoe soling is an economic proposition only for those who are concentrating field latex on a large scale and obtaining large quantities of skim. The recommended minimum production is one ton of masterbatch per day. This requires approximately 200 gallons of 60% concentrated latex and 2,000 gallons of 5 d.r.c. skim.

At present the potential demand for synthetic material used for shoe soling is approximately 3,000 tons per annum in the United Kingdom, with an expected increase to about 4,000 tons in 1955. This is the market we should be able to enter with the Malayan cyclised rubber masterbatch, provided the manufacturer in Malaya can produce at a price to compete with the present American synthetic material, and with the English material when this comes on the market. Australia and the continent of Europe may also have a demand for cyclised rubber.

Other uses for the masterbatch exist, such as for belting. Experiments are now in hand and so far the results are most encouraging.

Tapping Prior to Replanting

THE AREA OF OLD SEEDLING RUBBER TREES in Malaya which remains to be replanted with modern high yielding material exceeds 2½ million acres. The renewed bark of old trees, on which four or more tapping cycles may have been completed, is often thin and corrugated; the yields barely suffice to make tapping an economic proposition in times of low prices and high wages.

The replanting of many old seedling areas was interrupted by the war and is long overdue. As the task needs to be spread over a number of years estates are now confronted with the problem of how to obtain an economic yield from the old trees before they are cut out. This article discusses means of increasing the yield from such areas.

Treatment of renewed bark with a yield stimulating mixture — We now have enough evidence to show that, if the quality of the renewed bark is poor, *viz,* thin and corrugated, application of a yield stimulant to lightly scraped bark below the tapping cut will not increase yield appreciably. This is probably because scraping of such bark leads inevitably to rather extensive wounding, with results similar to those caused by deep scraping, which was shown in our pre-war experiments to depress yield. If the renewed bark is of good quality, as in our post-war experiments on the R.R.I. Experiment Station, a substantial response to yield stimulants may be expected.

Intensive tapping of renewed bark — If commercial tapping is done on a half circumference alternate daily tapping system, the intensity of tapping can be increased by tapping daily instead of alternate daily. A similar intensity can be obtained by opening a second half circumference cut, preferably on the opposite side of the tree, and tapping both cuts together alternate daily. This may result in an appreciable increase in yield if the quality of the renewed bark is satisfactory, but it is not expected that on old seedling trees a high yield level will be maintained for more than a year.

Experiments were carried out in Indonesia before the war on trees less than 24 years of age and previously tapped on conservative tapping systems, the most severe not exceeding a 67% intensity. Alternate daily or daily tapping on two cuts resulted in large increases in yield, which were maintained for two or even three years. Such large responses cannot be expected from old seedling trees which have been tapped more severely in the past, but for short periods of intensive tapping these systems may be effective, provided the renewed bark is of reasonable quality.

Ladder tapping of a high cut in the virgin bark — When tapping of renewed bark is uneconomic there is no alternative but to open new cuts in virgin bark above the old panels. In fact this method of high tapping is being used more and more extensively in Malaya and reports received from estates have been favourable.

The height at which the cut is opened depends on the replanting schedule, and should allow for a somewhat higher bark consumption than is usual – 12 to 14 inches a year on a half circumference alternate daily system. Furthermore it is known that, when tapping virgin bark above renewed bark, the yield may show a substantial decrease as the tapping cut approaches the junction of virgin and renewed bark. This

will be more pronounced if the renewed bark is of poor quality and it may be assumed that under these conditions a cut on virgin bark less than six inches above renewed bark may yield very little. A tapping cut should not, of course, be changed over to the opposite side of the trees before the expected decrease in yield has been observed.

If an area of old seedling trees is scheduled for replanting in, say, three years' time, tapping might be done on virgin bark on a high cut for two years, *e.g.* one year's tapping on each side of the tree. The height of each opening would then be 6 + 14 = 20 inches above the junction of virgin and renewed bark. After two years' tapping at normal intensity on the high cuts, slaughter tapping should commence, as discussed below.

A disadvantage of high tapping is that the tappers have to use ladders and tapping tasks are reduced in size. Reports from estates show that, depending on the stand per acre, a task of 250 to 300 trees can be completed by contract tappers on a half circumference alternate daily tapping system. The ladders should preferably have a platform to enable the tapper to keep the normal distance from the tree whilst tapping, as shown in *Figure 1*.

It is difficult to predict the yield increase when resorting to ladder tapping, as much depends on the condition of the trees. Experience shows that the yield per acre and the yield per tapper have been appreciably increased as a result of high tapping.

Ladder tapping and treatment with a yield stimulant — This combination has been tried in a few experiments, which are still in progress; although excellent yields have been obtained during the first few months after applying a yield stimulating mixture, it is too early yet to express an opinion on the future yield trend of the trees.

Slaughter tapping — Slaughter tapping is a means of extracting as much rubber from the trees as possible by tapping at a greatly increased intensity. It is often carried out without uniformity in the type of cut used — as when it is left to the tapper to tap all available bark within his reach — but there is little doubt that a controlled systematic tapping system is more satisfactory.

Unfortunately slaughter tapping is expensive and an increased yield per acre is often obtained at the cost of a lower yield per tapper. If the price of rubber is low in relation to the cost of tapping, this may suffice to make slaughter tapping uneconomic.

There are three principal ways in which the costs can be kept down, namely by selective tapping; by tapping several cuts on the trees at the same time; or by combining relatively low intensity slaughter tapping systems with the application of a yield stimulating mixture. Combinations of the three methods are possible.

Selective tapping — Under normal tapping systems on unselected seedling trees the lowest yielding 30% of the stand contribute only about 9% of the total crop, while the lowest yielding 50% give only 20 to 25% of the crop. A good way of reducing the high costs of slaughter tapping is to leave about 30% of the trees out of tapping, *i.e.* the lowest yielding group. The optimum proportion will vary greatly, not only with the price of rubber and the cost of labour, but also with the yield level of the trees and the past policy of thinning out low yielding trees.

Multiple cuts — The advantage is that the tapper spends more time in tapping and less time in walking. The disadvantage lies in the interference of one cut with another. That the yield from a normal tapping cut is greatly reduced by opening another cut a short distance below it is well known.

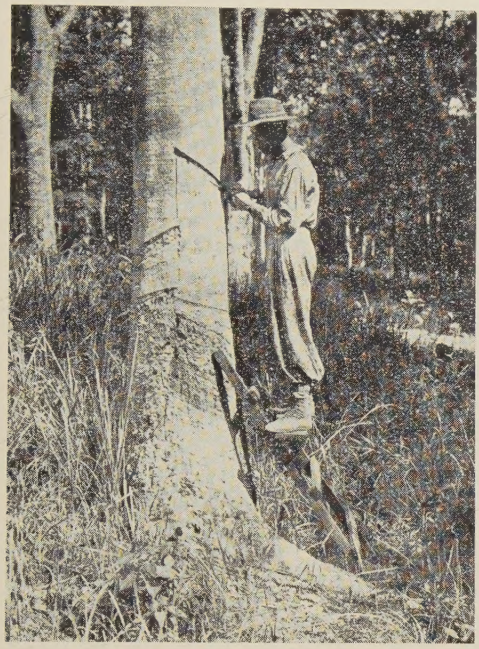

Figure 1. Ladder tapping. The high cut has been opened at 34 inches above the top of the renewed bark allowing for 2½ years' tapping in productive virgin bark on that side of the tree.

Note:

1. *Wrong height of opening of a previous high cut on the opposite panel i.e. too close to the junction of virgin and renewed bark.*
2. *The small platform on the ladder, enabling the tapper to stand at a comfortable distance from the tree.*

On tapping, rubber is extracted mainly from an area of bark below the tapping cut, so that interference between two superimposed cuts could theoretically be reduced by tapping the high cut in an upward direction. Normally, after a cut is first opened, shavings of bark are removed at each tapping from the lower side and the cut moves down the tree. With upward tapping the shavings are removed from the upper side and the cut moves up the tree, away from the ground. The area of bark from which the latex flows to the upward tapped cut will be mainly above the cut. This reduces the interference with the lower, downward tapped cut.

During the war, upward tapping was used extensively in Ceylon as part of a scheme of intensive tapping to increase the total output of rubber. It was found that if the cut was kept at a fairly steep angle (at least 30° from the horizontal) most of the latex would adhere to it and would flow to the cup without spilling, though a part would run down over the recently tapped bark to the channel formed when the cut was first opened, and thence to the cup (see *Figure 2*). With excessive spilling it is sometimes necessary to leave a quarter inch wide strip of bark untapped at intervals of about four inches to make a channel to collect the latex.

On large trees the cut is apt to get out of the reach of the tapper rather quickly. A full spiral cut is therefore unsuitable. Two half circumference cuts, either V or spiral, on opposite sides of the tree would be better but the greatest economy is to use a full circumference V cut, for only one spout and cup are then necessary. High cuts for upward tapping should preferably be opened in the virgin bark at a short distance ($\frac{1}{4}$ to $\frac{1}{2}$ inch) above the renewed bark, leaving a narrow ridge of virgin bark to catch the latex.

Low intensity tapping and yield stimulation – When treatment with a yield stimulating mixture is combined with a low intensity slaughter tapping system it may be a good policy to open up all trees for slaughter tapping and discard the trees which prove low yielding under these conditions.

Slaughter tapping with multiple superimposed cuts — The full circumference of the trees should be tapped downwards from the normal tapping levels and in addition a full circumference V-cut should be opened (preferably in the virgin bark) immediately above the normal tapping panels, and tapped upwards. Full circumference cuts (high and low) are preferred as this reduces the number of cups required, but if the bark position makes this impossible, four half circumference cuts may be used. Often the high and low cuts can be joined by a vertical channel so that provided the latex yield is not excessively high only one cup is required. Uniformity in the type of cut used on the different trees is not necessary although it has obvious advantages. An example of the arrangement of the cuts is shown in *Figure 5*.

The interval between tappings determines the intensity of the tapping system and the optimum intensity will vary greatly with the condition of the trees to be tapped. Broadly speaking, the better and healthier the trees the more heavily can they be tapped. The length of time during which the trees are to be tapped intensively must also be taken into consideration. With very heavy tapping the yields fall off quickly and a system suitable for six months would be unsuitable for longer periods. Schemes for slaughter tapping, depending on the length of time for which it is to be adopted, are given below.

A. *For periods of six months.* Tap alternate daily throughout (2C/1.d/2.400% or 4C/2.d/2.400%). If the yields are keeping up well at the end of the fifth month, daily tapping could be done during the last month and this should be highly selective: only those trees which are still yielding well should be tapped.

B. *For periods of twelve months.* Tap third daily (2C/1.d/3.267% or 4C/2.d/3.267%) for ten months. If the yields are then keeping up well, a more intensive and selective tapping on the same cuts could be done alternate daily (2C/1.d/2.400% or 4C/2.d/2.400%) during the remaining two months.

C. *For period of more than twelve months.* For the last twelve months tapping should be done as for the corresponding period in B. For any period previous to this, tapping should not exceed 100% intensity.

It will not always be practicable to open more than one half circumference cut in the renewed bark. Under these conditions the tapping system would be (3C/2.d/2.300%) in A and (3C/2.d/3.200%) in B followed by 3C/2.d/2.300%.

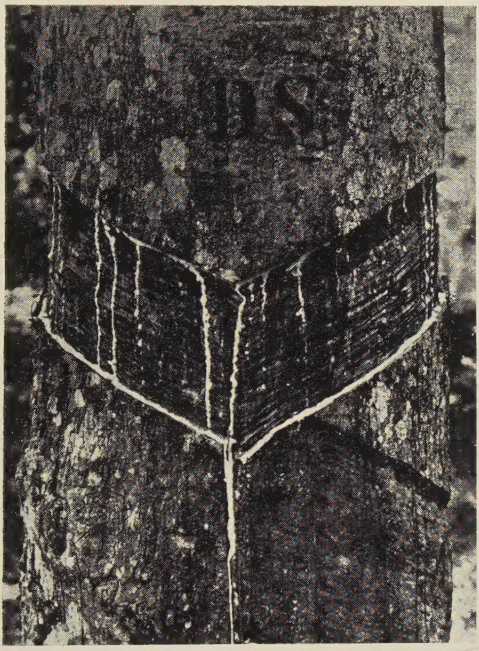

Figure 2. Upward tapping

Note:

Latex spilling over tapped bark and flowing down the channel formed when the cut was first opened.

Most of the latex would have flowed down the surface of the upper cut to a central channel if the slope of the cut had been steeper.

Bark consumption of trees tapped upwards on alternate days (as in recommendation A) may be at the rate of 17 inches per year and if tapped third daily (as in recommendation B) at the rate of 14 inches per year. Consequently stools or ladders may be required if the cuts get out of reach of the tappers.

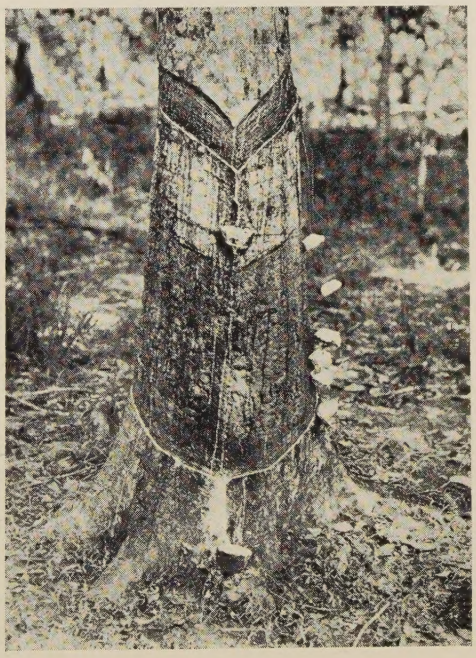

Figure 3. Slaughter tapping. This tree is tapped alternate daily on three half circumference V-cuts, one cut on renewed bark tapped downwards and two cuts on virgin bark tapped upwards — 3V/2.d/2.300%. The cuts have not been treated with a yield stimulant. The samples on the wire represent the yield of two tappings.

It is not possible to do more than guess at the yields to be obtained from slaughter tapping, for so much depends on the past history and present condition of the trees. Experiments carried out in Ceylon by the late Mr C.C.T. Sharp on well grown and good

yielding old seedling trees with full circumference systems of slaughter tapping showed that systems with upward tapping (2C/1.d/4.200% or 2C/1.d/2.400%) yielded appreciably more than systems of the same intensity with no upward tapping (2S/2.d/2.200% or 2S/2.d/1.400%). Trees in the former systems were tapped on two full circumference cuts at each tapping and the task size could be a little greater than half the size of the tasks tapped on single full circumference cuts, as long as no ladders were required. As the trees were tapped only half as often as trees in the single full circumference tasks, upward tapping offered an appreciable saving in tapping costs.

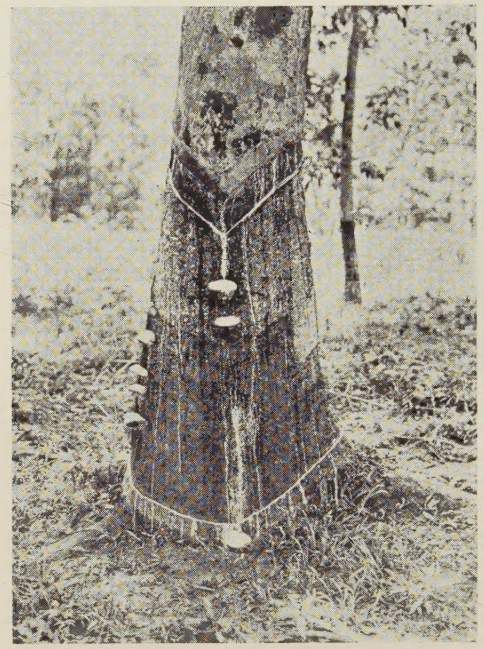

Figure 4. Slaughter tapping. This tree is tapped alternate daily on three half circumference V-cuts, as the tree in Figure 3, but the cuts have been treated with a yield stimulant. Note the two cups required to collect the latex from one of the high cuts on virgin bark treated with a yield stimulant. The samples on the wire represent the yield of one tapping.

Slaughter tapping with multiple cuts combined with the use of a yield stimulant — The results of two recent slaughter tapping experiments have shown that (*a*) a tapping intensity of 300 to 400% with upward tapping on a full circumference was best for periods of not more than six months; three-monthly applications of a yield stimulant resulted in a 12% increase in yield of the 300% intensity system (3C/2.d/2) and had little effect on the yield of the 400% intensity system (2C/1.d/2); (*b*) for periods of one year the most economic system for well grown old unselected seedling trees was one of 150% intensity with upward tapping on a full circumference and downward tapping on a half circumference every fourth day (3C/2.d/4.150%) combined with the use of a yield stimulant, which gave almost the same yields — over three times that of the half circumference alternate daily system — as a 300% intensity alternate daily system (3C/2.d/2.300%), with a considerable saving in tapping costs. In both experiments the yield stimulant was applied to a three inch wide strip of lightly scraped bark below the downward tapped cuts and above the upward tapped cuts once every four months.

There is evidence, however, that a yield increase of the same order would be obtained by treating only the high cuts with a yield stimulant.

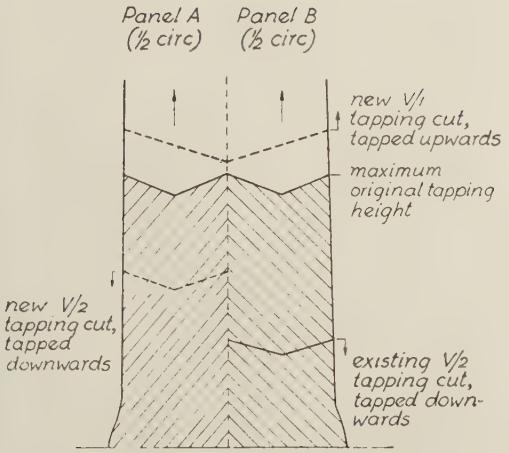

Figure 5. The old tapping panels A and B are shaded. It is assumed that before slaughter tapping started the trees are being tapped V/2 on panel B and this cut is shown by the unbroken line; the bark on the opposite panel A is insufficiently renewed for it to be possible to change the existing cut to an extended V-cut, so a second V/2 cut is opened on panel A (dotted line). A full circumference V-cut is opened on virgin bark and tapped upwards (dotted line).

This would result in a considerable saving in labour costs — as scraping of poor corrugated renewed bark is slow and laborious — and in a 50% saving in the expenditure on the yield stimulating mixture.

BOTANICAL DIVISION

R. R. I. News

The low modulus class of Technically Classified Rubber will in future be marked with a purple colour, but will still be designated Red Circle.

o

Application of a 5% oil solution of a 2,4,5-T derivative by means of a brush or a spray to the bark for a distance of 15 inches from the ground has proved fatal to rubber trees.

o

Methods of preparing purified rubbers commercially have been investigated. Low protein rubbers are best prepared by treatment of concentrate with pancreatic enzymes such as trypsin. Low acid content rubbers require two centrifugings. The two processes can be combined. A paper on this subject was contributed to the third Rubber Technology Conference at London this year, by Mr J.E. Morris of our Chemical Division.

o

In Ceylon, rubber estates of over 35 acres are obliged to cultivate at least 12% with food crops, or pay 10 rupees per acre to a food production fund.

New Applications

A new rubber flooring material, Elastoleum, is nearly ripe for full scale production. This is a development of the Dutch research organisation, Rubber-Stichting. The cheapest grades of rubber may be suitable for this application.

Poria Root Rot

FOUR ROOT DISEASES, *Fomes lignosus* (white root disease), *Fomes noxius* (brown root disease), *Ustulina zonata* and *Sphaerostilbe repens* have long been known as common to both Malaya and Ceylon, and as being of parallel importance in the two countries. Two more root diseases of hevea are known, both under the name red root disease. *Ganoderma pseudoferreum* in Malaya is second in importance only to *Fomes lignosus*. Ceylon has so far remained free from *Ganoderma;* there the name red root disease is used for *Poria hypobrunnea*, a fungus reported by Petch to be no more serious than *Sphaerostilbe*.

Poria had been known for many years in Ceylon before 1916 when it was recognised as a disease of rubber. The year 1916 is significant for only three years previously it had become apparent that the early close plantings were uneconomic and had to be drastically thinned. Unwanted trees were felled and their stumps left to rot in the ground. A variety of fungi penetrated the cut surfaces, including the widely distributed *Poria*. With roots of dead trees so intimately associated with those of the living, the ability of *Poria* to parasitise rubber roots from a contact source of infection soon became evident. Less extensive outbreaks arose from infected jungle stumps.

Poria may well have been present in Malaya as long as in Ceylon, though it was not recorded. A similar fungus was collected before the war both on rubber and on the cover plant *Tephrosia candida*, on which it is common in Ceylon. In 1949 the same fungus was found again on our Experiment Station at Sungei Buloh and was shown to be a parasite, but its identity was not established.

The only confirmed outbreak in Malaya was associated with an unusual planting practice. An area under old rubber had been planted, two or three plants per point with unselected seedlings. The old rubber was not poisoned until the year after planting the seedlings, causing them to take two years to reach a size for budding. Then there was a six month delay before budding commenced, making it out of the question to transplant the surplus seedlings. Accordingly they were cut off just below ground level and left to rot. This gave *Poria* the opportunity to infect the dying stumps and thence, by contact, the budded plant. *Figure 1* shows the intimate association between them. When the infection was discovered there was only slight penetration into the roots of a few trees. Subsequently one tree died.

The appearance of the disease is not so well defined as with the other root diseases; this perhaps explains why it has long remained unnoticed in Malaya. The rhizomorphs, which spread as a network over the affected root and collar, are black on the surface. The red colour commonly seen in Ceylon has not been observed here. Cleaning adhering soil particles from the rhizomorphs gives rise to white flecks wherever the outer skin is removed, for they are white within (*Figure 2*). The fructifications are flat plates covered with pores; they were not found in the field but readily formed on dead stumps kept continuously damp in the laboratory.

A *Poria* infection develops so slowly that its treatment is an easy matter, by stripping the rhizomorphs off the roots and washing with 2% copper sulphate solution as for the other root diseases. It can moreover be effectively prevented by not leaving stumps to rot in the ground.

Figure 1. The exposed root system of a two year old budding attacked by Poria. In contact with a lateral is the stump from which the infection came.

To thin out by cutting at ground level is to run a risk of starting infections not only of *Poria* but also of the *Fomes* species. When thinning to one plant per point the larger laterals should be severed and the seedling pulled out with its tap root. When thinning a stand the trees can be poisoned with sodium arsenite, following the procedure described on page 6 of *Planters' Bulletin 1.*

Figure 2. The upper portion of the stump of a two year old seedling that had been cut at ground level and so become infected with Poria. The dark mycelial network of Poria can be seen creeping over the surface, with white flecks showing wherever the outer skin has been removed.

It is hoped that planters who suspect they have *Poria* will send specimens for examination, as present records show only the one Malayan estate apart from the Experiment Station.

PATHOLOGICAL DIVISION

A Speculation in Seed

MANY PLANTERS WILL BE AWARE that the Botanical Division maintains an extensive series of trials of RRIM '500' series clones, standard clones and clonal seedling families on various estates by the cooperation of the companies and managers concerned. The trials were established prior to the Japanese occupation, and have now been in tapping for a number of years. The results of the experiments are under examination and will be published in due course. In the meantime the object of this article is to examine one aspect of the results of the clonal seedling trials and to point out some interesting observations.

Twentynine seedling families from various areas were tested in a number of trials at estates on inland soils. The budded control clone Pil B84 is common to all trials. When ranked in order, the highest yielding seedling family gave an average yield of 1233 lb per acre per annum over four years and the lowest yielding family gave an average yield of 829 lb per acre per annum over five years.

Twentyone families were tested in a similar manner at estates on coastal soils. Here the highest yielding family gave an average of 988 lb per acre per annum over 5 years, and the lowest yielding family gave an average of 713 lb per acre per annum over five years. It is a matter of common experience, and we have found it so in our experiments, that yields generally are lower on the coastal alluvial soils than on inland soils of normal fertility.

The best material is ranked in order of yield in the following two lists, for inland and for coastal soils.

INLAND SOILS

Clonal seedling material	*Mean yield over 5 yrs (lb/acre/yr)*
P.B.I.S.G. 'C,D&E'	1233
Tjir 1 selfed	1203
R.R.I. Field 18	1132
R.R.I. Field 14 A&B	1114
Batu Kawan I.S.G.	1100
R.R.I. Field 16 N	1060
Pil A44 × Pil B84	1049

COASTAL SOILS

Clonal seedling material	*Mean yield over 5 yrs (lb/acre/yr)*
P.B.I.S.G. 'C,D&E'	988
RRIM 507 mother seed	960
Tjir 1 selfed	942
Batu Kawan I.S.G.	929
R.R.I. Field 22	927
Sab 24 mother seed	907
R.R.I. Field 18	904

While these results confirm our opinion of seedlings from Prang Besar Isolated Seed Gardens C, D and E, and of Tjir 1 selfed seedlings, there are three points worth further consideration.

Firstly that the 29 families on inland soil and the 21 families on coastal soil showed respective differences between the highest and

lowest yielders of 404 lb per acre per annum and 275 lb per acre per annum. These differences are small in view of the number of families.

Secondly that three collections from R.R.I. fields figure in the list of the seven best families on inland soil, and two collections from R.R.I. fields in the second list for coastal soil. None of these fields was designed as a seed garden, but they were made up as below:

Field 18. Each row in the field was budded in succession with clones PB 25, 180 and 186, Gl 1, Sab 24, Rub 393, SReko 9, Pil B84, BD 5 and 10, Tjir 1 and 16, AVROS 49, 50, 152 and 256. A few plants were left unbudded.

Field 14 A&B. The northern 20 acres budded at 20 ft × 20 ft and the southern 20 acres budded at 24 ft × 24 ft with new clones prepared from the 1929 and 1930 (Pilmoor) hand pollinated seedlings. From three to six trees were budded for each clone and every thirteenth tree was budded with clone AVROS 50.

Field 16N. A trial of the hand pollinated seedlings of the 1929 crosses with some illegitimate seedlings. Seed from this field is the lowest yielder in the coastal trials.

Field 22. Trees were budded in succession along the rows with clones AVROS 49 and 152, PB 186, Rub 393 and Tjir 1.

Thirdly that the Prang Besar gardens when originally planted were of a speculative nature insofar as it had not then been possible to test the results of the expected crosses. In the event the speculation appears to have been most successful.

These points can be summarised by saying that there is not a large difference between families of clonal seeds (as compared with the differences between clones), and that casual collections of clonal seeds give surprisingly good results. Add to this the fact that a speculative seed garden has given the best results of all the collections, and it remains to be seen if a similar speculation might not be equally successful.

If any planter is interested in such an undertaking we suggest to him a seed garden planted with some of the RRIM '600' series clones. He will almost certainly get a good yield from the clones we have selected for it, and the seed as shown above is not likely to prove too disappointing, even at the worst. It may prove to be surprisingly good.

At present, as our article in *Planters' Bulletin 4* on seed gardens shows, we recommend only known and tested parents, or those parents of which our colleagues in other countries give good report. All that is known of the parents we now suggest is that they are fertile, and flower approximately together in time. The parents are also of about equal vigour and are the descendants of good parents.

Although others can be used, the clones we have in mind are:

RRIM 600	Parents, Tjir 1 × PB 86
RRIM 601	Parents, Tjir 1 × Gl 1
RRIM 605	Parents, Tjir 1 × PB 49
RRIM 610	Parents, RRIM 504 × Tjir 1
RRIM 613	Parents, Tjir 1 × RRIM 509
RRIM 623	Parents, PB 49 × Pil B84

We suggest that they should be randomised by trees in a small block of about 10 acres at the end of a planting that is not surrounded by

other rubber. The method of randomisation can be along rows or in small plots similar to the knights move in chess.

If anyone wishes to indulge in this speculation, we would be pleased to discuss it with him in the Botanical Division, either personally or by letter.

BOTANICAL DIVISION

Correspondence

The Editor of PLANTERS' BULLETIN *invites letters of general interest for publication in this column. Comment and queries arising from articles recently published will be welcome.*

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COVERS AND WEEDING

At the end of a very interesting article of the above title, which appeared in *Planters' Bulletin 13* (page 67), the question was asked 'What of the future of weed control on rubber estates?' In the course of discussion it was said that 'There appear to be considerable possibilities for a greatly extended use of chemical weedkillers in cover crop control operations on rubber estates. These will occur principally in young areas where weed control problems are more urgent'.

While in full agreement that this is likely to be the trend for rubber areas in their second or third year from planting, I question whether such spraying would not be dangerous for younger plants.

Nor could regular periodic spraying be relied upon in the wet season. The first two years in the life of a rubber tree are supposed to be the most important ones. Is there no alternative to harmful hand methods for control of weeds in such young rubber, other than spraying?

The practice of mulching with lalang or some other material has now been adopted on more than one estate in Malaya, but was not mentioned in your article. I think that the merits of mulching far outweigh those of any other system for weeding young rubber, and that it will in time become the accepted practice.

The planting community would doubtless appreciate some account of the pros and cons of mulching based on the experience of your Soils Division.

Bukit Kledek Estate
M.J. Kennaway
Manager

Mulching is beneficial because it conditions the soil favourably for root development and, after decomposition, provides valuable plant food. We doubt whether it obviates the need for further control of weeds by spraying or hand weeding.

Mulching is usually done on estates by placing plant residues around the bases of the rubber plants. This layer, if thick enough, will check the weeds in the restricted area of application, but during the early growth of the rubber plants a larger area needs to be weeded. Even if the strips along the planting rows were mulched throughout, some additional control of ground cover would probably be needed. Mulching on this scale is seldom done—Editor

Light Coloured Sheet

The Indonesian establishment for research on the product, known as I.N.I.R.O., has recently been investigating a combination of oxalic acid and sodium benzoate for coagulating rubber. They have obtained sheets of very light colour, at a slight increase in cost, and they anticipate certain advantages.

This sheet might replace pale crepe in compounds of light colour; dirt is easier to detect; the chemicals used reduce maturation in the unsmoked sheet considerably and it appears that the technical properties of the final sheet, such as strain, may vary less; the new sheet dries quicker, but also picks up water from humid air more readily.

The amounts of the chemicals used are 0.7% of oxalic acid and 0.4% of sodium benzoate, by weight.

Because of its rapid absorption of moisture, this sheet appears to be more scorchy than normal smoked sheet, although its scorch rate is about the same when it is fully dry. Scorch testing calls for a rigorous control of humidity.

Non-Rubber Constituents of Latex

Variations in natural rubber are largely due to the non-rubber constituents of latex. We have concentrated on finding out what they are, on separating them, and on determining their influence on both latex and dry rubber.

To begin with we prepared a clear latex serum by high speed centrifuging, removing and freeze drying the underlayer. The non-rubber constituents were separated into three main fractions, and sent to B.R.P.R.A. for detailed analysis. Seven different proteins were identified. In Malaya, we have identified other substances, called phosphatides, and have studied the changes which occur during storage — these appear to arise from the activities of enzymes.

On the dry rubber side, we have investigated the factors which lead to the variability in vulcanisation. Various rubbers, ranging from skim crepe and with differing amounts of non-rubber constituents, have been dissolved and their acid and basic materials estimated. These figures accounted for more than 90% of the natural variability in vulcanisation. With smoked sheet, however, only a 50% explanation is thus possible—there is obviously an unknown third factor.

Mechanical Stability of Latex

As mentioned under this heading on page 52 of *Planters' Bulletin 12*, the latest A.S.T.M. specification stipulates that concentrate is to be diluted with 1.6% ammonia solution to 55% total solids content before testing for mechanical stability.

The American Society for Testing Materials inform us that their final specification for minimum mechanical stability will be 475 seconds, instead of the tentative specification of 400 seconds.

This new specification is in line with the value of 600 seconds for latex tested at 51.5% total solids which was in use until the concentration of 55% total solids was adopted. It is also in line with our advice that latex producers should attempt to meet a minimum specification of 500 seconds.

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R. R. I. Lectures to Planters

During 1955 it will be possible for the following lectures to be given by senior officers of the institute. The demand for such lectures has been considerable and we cannot undertake to meet all requests. Early application, for not more than two fixtures, is therefore recommended and alternative choices should be given.

SOILS DIVISION

G. OWEN: *Soils and the nutrition of the rubber tree*

BOTANICAL DIVISION

E.D.C. BAPTIST: *Subjects of topical interest*
C.W. BROOKSON: *Improvement of hevea*
P. DE JONGE: *Yield stimulation*
P.R. WYCHERLEY: *Hevea planting material*

PATHOLOGICAL DIVISION

A. NEWSAM (after September): *Recognition of pests*
F.W. HUTCHISON: *Root diseases*
R.N. HILTON: *Windborne diseases*

CHEMICAL DIVISION

L.L. BEST (before March): *Recent improvements in T.C.R.*
J.E. MORRIS: *Control of latex quality*

Inquiry should be made of the Director.

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